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CALIFORNIA PETROLEUM TRANSPORTATION FUELS PRICE FORECASTS

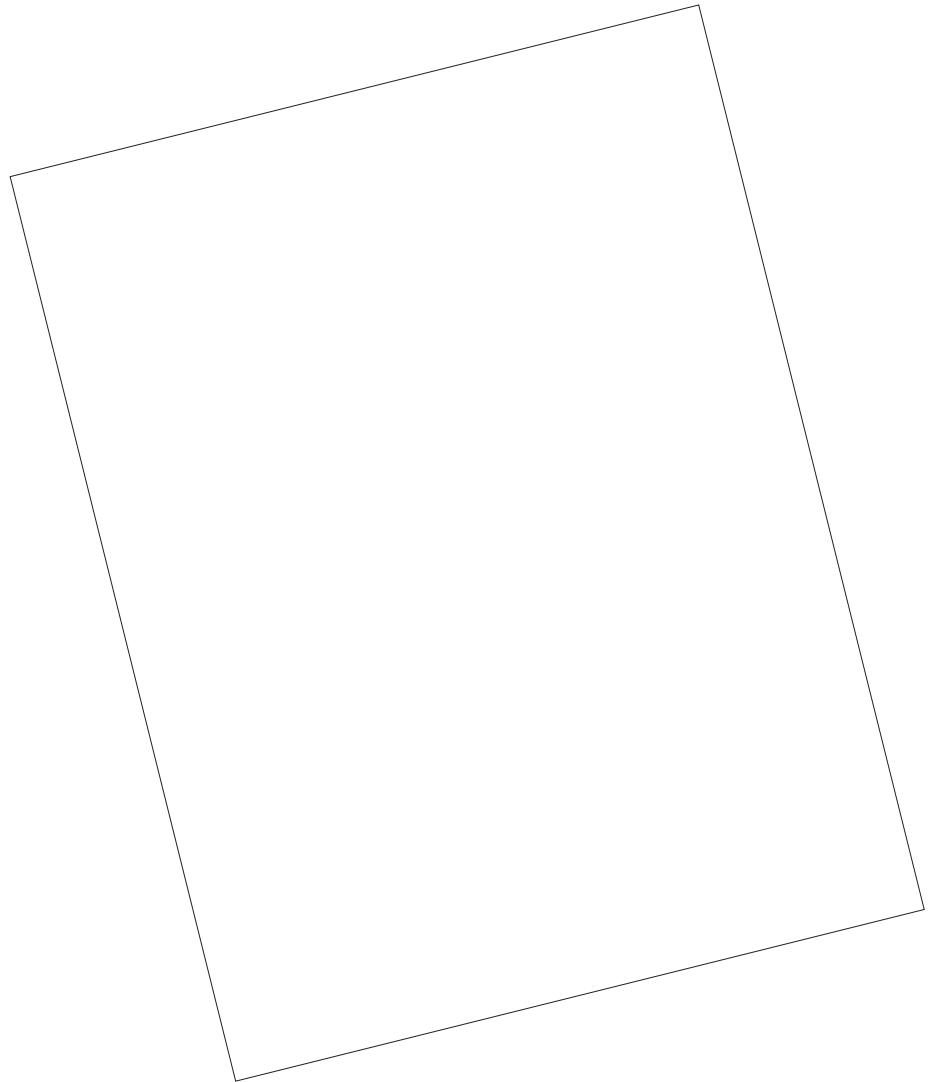
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CALIFORNIA ENERGY COMMISSION

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Disclaimer

The views and conclusions expressed in this document are those of the staff of the California Energy Commission and do not necessarily represent those of the California Energy Commission or the State of California.

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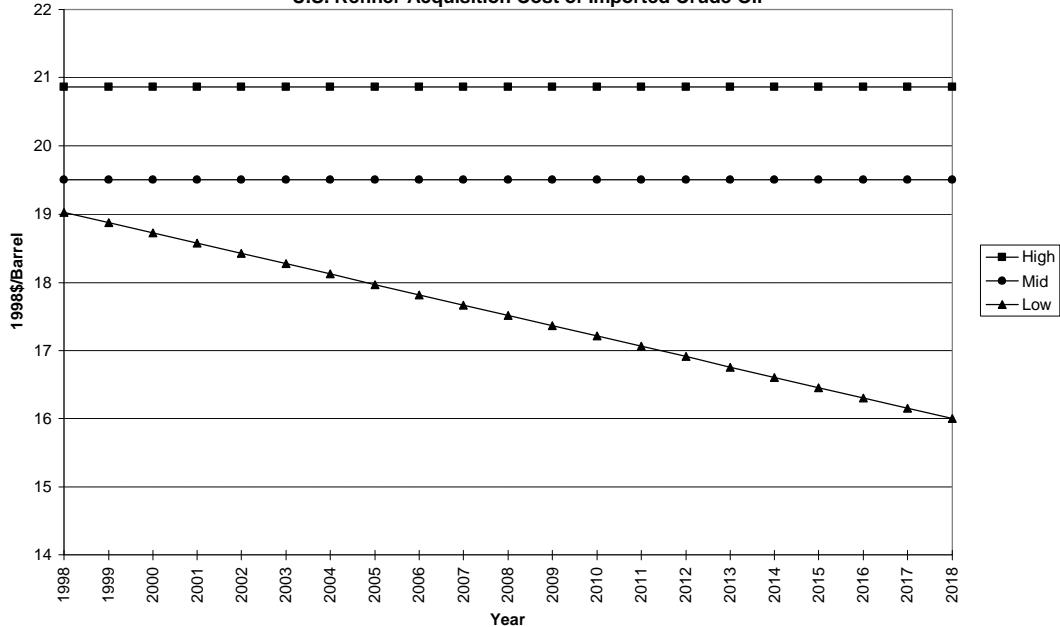
California Petroleum Transportation Fuels Price Forecasts

Background Assumptions

Energy Commission staff has developed long-term California petroleum transportation fuels price forecasts for the **1997 Fuels Report**. The foundation for these forecasts is staff's world crude oil price forecast, discussed in a staff draft issue paper¹ and at a hearing of the Commission's Fuels and Transportation Committee held on September 25, 1997. Staff propose three slightly-revised long-term projections of world oil prices (shown in Figure 1) that are the basis for price forecasts for the following petroleum fuels: California Air Resources Board (CARB) Phase 2 reformulated gasoline, CARB-specification reformulated #2 highway diesel, railroad diesel, agricultural diesel, commercial jet fuel kerosene and fleet propane. These oil price projections are based on three alternative trend extrapolations of historical world oil price data. The high and mid-price cases are "mean-reverting"; *i.e.* prices are assumed to vacillate around a long-term central tendency. Prices in the high oil price case are equivalent to the average world oil price for the period following the collapse of OPEC official pricing, 1986-97 (\$20.86/barrel in 1998\$²). Prices in the mid-price case are equivalent to the average oil price after the Persian Gulf War, 1991-1997 (\$19.51/barrel). Both cases are projected at a flat (zero) rate of real oil price growth. The low-price case starts from the 1997 price of \$19.18/barrel and declines linearly such that it ends at \$16.00/barrel in 2018. This decline was estimated by staff from suggestive, but inconclusive statistical evidence that real oil prices may be declining over time. The index for these three oil price forecasts is the U.S. refiner acquisition cost of imported crude oil, as reported historically by the U.S. Department of Energy/Energy Information Administration (DOE/EIA).

In establishing correlations between oil and product prices, however, staff has used Alaska North Slope (ANS) delivered-to-California crude oil prices from Platt's Oilgram Price Report as the oil price index. Several reasons dictated these choices. The DOE/EIA index was more consistent in establishing a longer term trend extrapolation than ANS, due to the recent lifting of the export restriction on Alaskan oil. The ANS price is, however, more relevant to California refiners since most out-of-state oil supplies come from Alaska, and the relevant period for establishing the crude price/product price correlations is more current (*i.e.* since Spring 1996, when CARB Phase 2 gasoline was required). An adjustment calculated at 25 cents/barrel based on recent differentials is made to account for the comparatively lower ANS oil price compared to the DOE/EIA index when projecting petroleum fuels prices using the forecasts shown in Figure 1. ANS prices used are reported in the product price spreadsheets found in Appendix A.

Figure 1
CEC Staff World Oil Price Projections
U.S. Refiner Acquisition Cost of Imported Crude Oil



Other assumptions made in generating the product price forecasts are very important to the final price trajectories. First, an assumption must be made about the rate of real growth in state and federal excise taxes. The high- and mid-price cases assume constant real excise taxes, or rising in nominal terms to keep pace with inflation. This is consistent with historical trends in highway fuel excise taxation. The low-price case assumes that no new excise taxes are imposed, so that excise taxes stay constant in nominal terms, thus declining in real terms³.

The second set of assumptions consider the effect that changing levels of distributor and/or dealer markup can have when building a retail petroleum product price projection from a spot- or rack-based product price projection. As will be explained with each individual fuel, different assumptions can be made about both the level and trajectory of this markup, with significantly differing impacts on final retail prices projected over time. The baseline assumption in all forecast cases has been to maintain a constant markup in real dollar terms at a given level.

Thirdly, these projections also assume that no significant changes will be made to fuel specifications to meet new or revised environmental regulations. This is particularly pertinent with regard to CARB Phase 2 gasoline. If changes in oxygenate requirements are made in response to recent concerns over the use of MTBE in reformulated fuels, the price projections for gasoline in California, and probably for the whole product slate, will

have to change as well. A current study undertaken by the Energy Commission will attempt to quantify the effect of alternative strategies for removing or limiting the use of MTBE in gasoline. At this time, however, neither the effects of changing oxygenate requirements, nor of Arizona (which gets its gasoline supply from out-of-state) possibly also adopting CARB Phase 2 RFG standards, are directly incorporated into the price forecasts. The projections also do not attempt to include the potential effects of policies implemented to meet U.S. commitments in reducing greenhouse gas emissions. Unless lower-cost alternative fuels, efficiency measures and/or greenhouse gas emission trading rules can effectively lower demand for targeted petroleum fuels, the pump price of these fuels may have to rise. This might be effected by raising excise taxes faster than the rate of inflation, so that they rise in real terms. On the other hand, success in lowering demand for petroleum fuels would also tend to lower their price over time.

Finally, an effort will be made to introduce the concept of volatility as an explicit part of the petroleum product price forecast. Even if a long-term average, or equilibrium, price forecast conforms with actual events, price variation is inevitable. An equilibrium price trajectory with large inherent variation, however, is significantly different for planning purposes than the same equilibrium trajectory with little variation. For instance, alternative fuels in switchable (*e.g.* hybrid or flexible-fuel) applications, that are on average slightly more expensive than conventional fuels might be price-competitive more often if the expected variation in conventional fuel prices is large, rather than small. Staff has attempted to quantify that portion of product price volatility that can be attributed to "normal" oil price volatility. However, no attempt has been made at this time to quantify the effect of other sources of volatility, other than to identify possible factors such as changing taxation levels and dealer margins, and major unplanned refinery outages.

CARB Phase 2 Reformulated Gasoline

The search for a sufficiently explanatory regression equation linking crude oil prices with CARB Phase 2 reformulated gasoline (CARB Phase 2 RFG) prices was difficult. The reasons for this are the short time frame of the relevant data -- from the spring 1996 introduction of CARB Phase 2 RFG through late 1997 -- and the extremely large fluctuations that occurred in CARB Phase 2 RFG prices shortly after introduction due to unexpected factors, in particular refinery outages.

A regression equation was developed using data gathered weekly from Platt's Oilgram Price Report -- with spot regular unleaded gasoline prices in Los Angeles as the dependent variable and ANS crude oil prices delivered to California as the independent variable. The data had to be manipulated in three steps, however, before this attempt was considered successful. First, all data was smoothed (averaged) over a 26 week period. Second, a four week lag was introduced between each oil price and its related CARB Phase 2 RFG price⁴. And third, all price data prior to May 15, 1996 (the period of greatest volatility due to refinery outages during the introductory period) was deleted.

These steps all substantially reduced the degrees of freedom, but with each step the significance of the independent variable and its explanatory power increased. The final equation had a t-stat of 12.1 and an R Squared of 0.74.

With this equation, spot gasoline prices could be projected for the three crude oil price cases. The appropriate markup was then added to convert the spot gasoline price to an ex-tax retail price. Staff assessed the historical data for spot-to-retail price differentials for reformulated gasoline in California found in the **DOE/EIA Petroleum Marketing Monthly**.

The differential was determined to be about \$0.17/gallon. Staff propose using this amount of markup for the mid- and low-price cases, but a larger figure of \$0.21/gallon for the high case. This higher figure is more in line with longer-term historical spot-to-retail markups for conventional gasoline for the different Petroleum Administration for Defense Districts (PADDs) with major spot markets⁵.

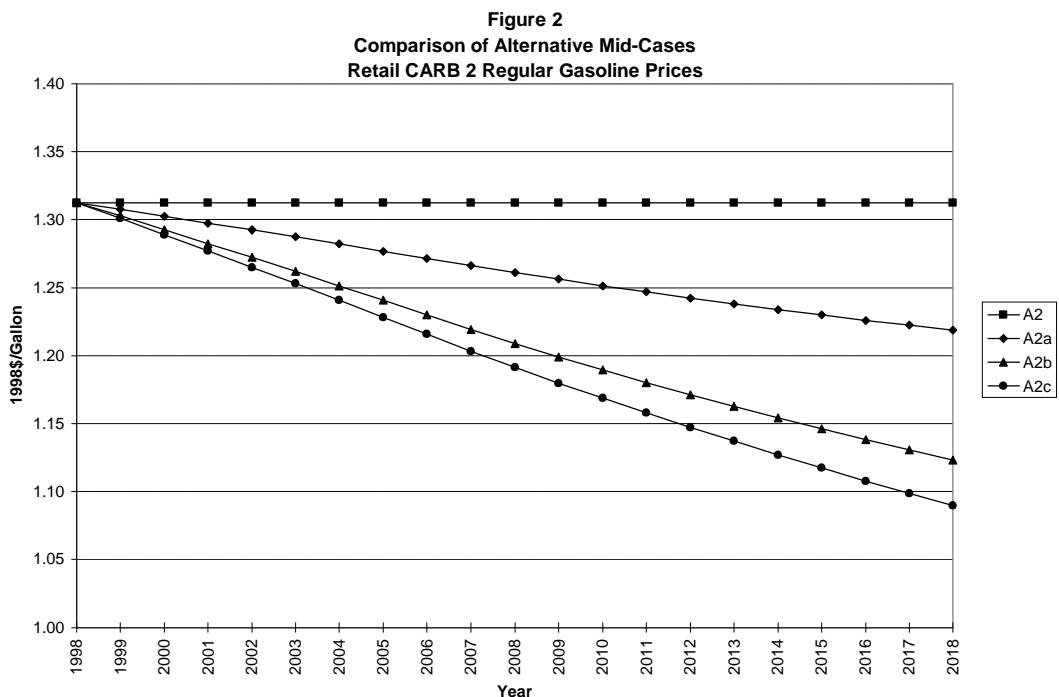
Next, the appropriate assumptions regarding highway excise taxes noted above for each of the cases were included. For the mid- and high cases, these taxes were \$0.183/gallon federal and \$0.18/gallon state, and for the low case these values were deflated over time⁶. Finally, a weighted state sales tax of 7.89% was applied to the aggregated total of these components of price for a final projected CARB Phase 2 RFG price.

For mid-grade and premium gasoline, staff averaged the differences between grades using retail price information from the Oil Price Information Service (OPIS). These differences appeared to be fairly stable in recent years, at about \$0.114/gallon for mid-grade minus regular, and \$0.20/gallon for premium minus regular. These differences are added to the regular unleaded price forecast discussed above to provide projections for these grades. Table 1 summarizes CARB Phase 2 RFG price forecasts for the three cases, which are shown in more detail for regular grade in Appendix A, Tables A1-A3.

Table 1. CARB Phase 2 Reformulated Gasoline Price Projections (1998\$/gallon)

Case	1998	2008	2018
High Price			
Regular	\$1.374	\$1.374	\$1.374
Mid-Grade	\$1.488	\$1.488	\$1.488
Premium	\$1.574	\$1.574	\$1.574
Mid Price			
Regular	\$1.312	\$1.312	\$1.312
Mid-Grade	\$1.426	\$1.426	\$1.426
Premium	\$1.512	\$1.512	\$1.512
Low Price			
Regular	\$1.306	\$1.181	\$1.075
Mid-Grade	\$1.420	\$1.295	\$1.189
Premium	\$1.506	\$1.381	\$1.275

The importance of the major assumptions discussed above, and their effects over time, are illustrated in Figure 2. Staff generated three additional “sensitivity” cases (designated A2a, A2b, and A2c for the spreadsheet numbers assigned to them in Appendix A) to show modifications of these various assumptions for the mid-price case (A2) only. Case A2a assumes that the state excise tax on regular-grade CARB Phase 2 RFG is held constant in nominal terms, rather than in real terms. Case A2b assumes that both state and federal excise taxes are held constant in nominal terms. Case A2c assumes that state and federal excise taxes are held constant in nominal terms, and the markup declines 1% per year in real terms.



CARB Reformulated Diesel Fuel

While CARB reformulated diesel fuel has been required since October 1993, only price data since Spring 1996 was used by staff to establish correlations with crude oil prices. This was because with the introduction of CARB Phase 2 reformulated gasoline, the entire petroleum refining process for in-state refiners had to be changed to meet the new requirements, including the output of distillate fuels.

A regression equation was developed using weekly state diesel rack prices reported by OPIS as the dependent variable and ANS crude oil prices delivered to California reported by Platt's as the independent variable. As with the CARB Phase 2 RFG analysis, the best fit equation was obtained by "smoothing" prices over 26 weeks, and by eliminating data prior to May 15, 1996. In this case, however, a two week lag between crude and product prices proved a better fit than a four week lag. The final equation had a t-stat of 27 and an R Squared of 0.93.

Average markup was determined by assessing differentials between diesel rack prices and diesel retail prices reported by OPIS, after excluding taxes. During 1997, this rack-to-retail markup was found to be about \$0.154/gallon. This value was used in the mid- and low price cases, but a higher figure -- \$0.19/gallon -- was used for the high case. For the mid- and high cases, the federal excise tax of \$0.243/gallon was added to the rack price plus markup, sales tax was calculated, and lastly the state excise tax of \$0.18/gallon was added. For the low case, federal and state excise taxes were deflated as appropriate.

Prices for railroad diesel and off-road agricultural diesel fuel were also developed. For railroad diesel, the CARB reformulated diesel rack price previously generated was used as the base price, to which the federal excise tax of \$0.069/gallon was added (constant real in the high and mid-cases, deflated in the low case), followed by the calculated state sales tax. For off-road agricultural diesel (which is exempt from excise taxes), the rack price was the base price, to which was added a distributor markup of \$0.08/gallon (\$0.10/gallon for the high case), followed by calculated state sales tax⁷. Table 2 summarizes the various diesel fuel price projections.

Table 2. California Diesel Fuel Price Projections (1998\$/gallon)

Case	1998	2008	2018
High Price			
CARB Diesel	\$1.450	\$1.450	\$1.450
Railroad Diesel	\$0.877	\$0.877	\$0.877
Agricultural Diesel	\$0.911	\$0.911	\$0.911
Mid Price			
CARB Diesel	\$1.364	\$1.364	\$1.364
Railroad Diesel	\$0.830	\$0.830	\$0.830
Agricultural Diesel	\$0.842	\$0.842	\$0.842
Low Price			
CARB Diesel	\$1.347	\$1.177	\$1.027
Railroad Diesel	\$0.813	\$0.740	\$0.670
Agricultural Diesel	\$0.825	\$0.772	\$0.718

Commercial Jet Fuel Kerosene

Correlations between crude oil prices and jet fuel kerosene prices were established using similar means as those for gasoline and diesel. A regression equation was developed using jet fuel spot prices in Los Angeles (from Platt's) as the dependent variable and ANS prices delivered to California (also from Platt's) as the independent variable. The best fit was achieved using 26 week smoothing and deleting data before May 15, 1996, as with diesel and gasoline. Using lags between crude oil and jet fuel kerosene prices reduced the fit of the equation, however, so no lag was included for this fuel. The t-stat for the final equation was 81.8 and the R Squared was 0.99.

Average markup from the spot price was determined to be \$.06/gallon for commercial fleets for the low and mid-price cases. For the high case \$.08/gallon was used. The federal excise tax of \$.044/gallon was added, then state sales tax calculated and added. For the low case, the federal excise tax was deflated as appropriate. Table 3 summarizes commercial jet fuel kerosene price projections for the three cases.

Table 3. California Commercial Jet Fuel Kerosene Price Projections (1998\$/gallon)

Case	1998	2008	2018
High Price	\$0.864	\$0.864	\$0.864
Mid Price	\$0.787	\$0.787	\$0.787
Low Price	\$0.768	\$0.693	\$0.620

Commercial Fleet Propane

Correlations between crude oil prices and propane prices were established using refinery prices of propane sold in the Los Angeles area (from OPIS) and ANS prices delivered to California (from Platt's). The best fit for the regression equation was obtained using 26 week smoothing, a two week lag between oil and propane prices, and deleting data before May 15, 1996. The t-stat for the chosen equation was 37.2 and the R Squared was 0.96.

Markup was assumed to be \$0.25/gallon and the newly adjusted federal excise tax of \$0.136/gallon⁸ was also added to the projected refinery price. Sales tax was calculated and added, and lastly the state excise tax of \$0.06/gallon was added⁹. For the low case, state and federal excise taxes were deflated as appropriate. The final projections for propane are summarized in Table 4.

Table 4. California Commercial Fleet Propane Price Projections (1998\$/gallon)

Case	1998	2008	2018
High Price	\$1.023	\$1.023	\$1.023
Mid Price	\$0.941	\$0.941	\$0.941
Low Price	\$0.912	\$0.765	\$0.628

Product Price Volatility

There are many factors that can affect the volatility of average annual petroleum product prices around a long-term equilibrium price. One obvious factor is oil price volatility. An attempt has been made to quantify the expected variation of product prices around their long-term trajectory due to oil price variation. As noted in the first section, the high case oil price projection was based on the average of real oil prices for the period 1986-97 (\$20.86/barrel for U.S. refiner acquisition cost of imported crude oil in 1998\$). The standard deviation for oil prices around this mean for the same period was \$2.91/barrel (all prices are in 1998\$). Using the coefficients for the various petroleum product price regression equations (see spreadsheets in Appendix A), for the high case staff has calculated the range of expected product prices around their long-term equilibrium price trajectories due to oil price variation of this magnitude¹⁰. The average annual crude oil price for the period 1991-97 was \$19.51/barrel, with a standard deviation of \$1.95/barrel. This standard deviation was used to calculate the ranges of product prices due to oil price volatility in both the mid- and low cases. The spreadsheets indicate the ranges for product prices for both one and two standard deviations of oil price variability.

Oil price variation is, however, not the only possible source of long-term petroleum product price variation around an equilibrium price trajectory. For one thing, not all variation in wholesale product prices is explained by the regression equations. This is particularly true for the regression equation for CARB Phase 2 RFG prices, which has an R Squared of 0.74. It is less true of the other products' equations, which have much higher R Squared values (0.93-0.99). Even so, simplifying assumptions for other important factors made in calculating end-user product prices, such as stable trends for markup, state and federal excise taxes, and state sales taxes, and the lack of major accidental refinery outages of long duration would actually be expected to display much more variation over time. Conceivably, the historical variation in these factors could be quantified and, with more difficulty, melded with the inherent oil price volatility to

produce a more encompassing calculation of the range of average annual product price volatility. Such calculations are, however, beyond the scope of the current analysis.

Product Price Comparisons

Table 5 summarizes the comparisons of the various end-user costs of petroleum products on an equivalent basis of dollars per million Btus heat content for the given assumptions discussed in previous sections.

Table 5. California Petroleum Product Price Projections (1998\$/million Btu)

Case	1998	2008	2018
High Price			
CARB 2 Gasoline	\$12.38	\$12.38	\$12.38
CARB Diesel	\$11.27	\$11.27	\$11.27
RR Diesel	\$ 6.81	\$ 6.81	\$ 6.81
Ag Diesel	\$ 7.08	\$ 7.08	\$ 7.08
Jet Kerosene	\$ 6.74	\$ 6.74	\$ 6.74
Propane	\$11.81	\$11.81	\$11.81
Mid-Price			
CARB 2 Gasoline	\$11.82	\$11.82	\$11.82
CARB Diesel	\$10.60	\$10.60	\$10.60
RR Diesel	\$ 6.45	\$ 6.45	\$ 6.45
Ag Diesel	\$ 6.54	\$ 6.54	\$ 6.54
Jet Kerosene	\$ 6.14	\$ 6.14	\$ 6.14
Propane	\$10.86	\$10.86	\$10.86
Low Price			
CARB 2 Gasoline	\$11.77	\$10.64	\$ 9.68
CARB Diesel	\$10.47	\$ 9.15	\$ 7.98
RR Diesel	\$ 6.32	\$ 5.91	\$ 5.49
Ag Diesel	\$ 6.41	\$ 6.00	\$ 5.58
Jet Kerosene	\$ 6.00	\$ 5.41	\$ 4.84
Propane	\$10.53	\$ 8.83	\$ 7.25

Net energy content conversion rates are as follows¹¹:

CARB Phase 2 Reformulated Gasoline -- 111,000 Btu/Gallon
 Diesel -- 128,700 Btu/Gallon
 Jet Kerosene -- 128,095 Btu/Gallon
 Propane -- 86,650 Btu/Gallon

Endnotes

¹ James Page (August 1997). **Historical and Projected World Oil Prices**. Staff draft issue paper in support of the **1997 Fuels Report**. Fuel Resources Office, Energy Information and Analysis Division, California Energy Commission.

² All crude oil and petroleum product prices referred to in this paper are in constant (inflation-adjusted) 1998\$.

³ For detailed analysis of the impact of these assumptions on product prices see: Gordon Schremp (October 1995). **Transportation Fuels Tax Analysis**. Publication #P300-95-017D. Fuel Resources Office, Energy Information and Analysis Division, California Energy Commission.

⁴ This conforms with findings in: DOE/EIA (July 1997). **Motor Gasoline Assessment: Spring 1997**.

Washington, D.C. See Figure 6.1, page 43. This lag was found less useful, however, in diesel fuel and jet kerosene regression analysis as discussed in the following sections due to the greater sensitivity of distillate prices to oil prices (also evidenced by higher regression coefficients for distillates).

⁵ ibid. See Table 5.1, page 34.

⁶ The deflator series used was developed April 1997 by Kate Sullivan of the Demand Analysis Office, Energy Information and Analysis Division, California Energy Commission.

⁷ While EPA low sulfur diesel fuel can be used in off-road agricultural and railroad applications, an uncertain but substantial percentage of the diesel consumed in the state on farms and by railroads is in fact CARB diesel. It was thus not deemed necessary to generate a separate regression equation for EPA low sulfur diesel fuel.

⁸ The "Taxpayer Relief Act of 1997" reduced the federal highway excise tax for methanol, liquid natural gas, and liquid petroleum gas (propane).

⁹ Since operators of propane vehicles can instead pay an annual flat fee based on vehicle type or weight, an alternative assumption would have been to divide that fee by an estimated average yearly propane usage figure to calculate the state excise tax component.

¹⁰ It should be noted that the regression coefficients for CARB diesel (1.3681), jet kerosene (1.5973) and propane (2.3702) are considerably higher than for CARB Phase 2 RFG (0.5353), indicating more sensitivity for distillate and propane prices with respect to oil prices than for gasoline.

¹¹ Conversion rates may vary over a range according to the source. These rates are from Gordon Schremp (October 1995). **Transportation Fuels Price Analysis**. Publication #P300-95-017C. Fuel Resources Office, Energy Information and Analysis Division, California Energy Commission

Appendix A

Petroleum Product Price Forecast Spreadsheets

Table A1 - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (High Case)										Gasoline Price Range due to Oil Price Volatility **	
Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
1999	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2000	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2001	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2002	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2003	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2004	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2005	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2006	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2007	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2008	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2009	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2010	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2011	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2012	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2013	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2014	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2015	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2016	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2017	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454
2018	20.61	29.42	0.700	0.210	0.910	0.183	0.180	0.0789	1.374	1.334 - 1.414	1.294 - 1.454

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1+ state sales tax)

Table A2 - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (Mid-Case)

Gasoline Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
1999	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2000	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2001	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2002	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2003	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2004	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2005	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2006	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2007	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2008	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2009	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2010	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2011	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2012	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2013	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2014	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2015	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2016	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2017	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
2018	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A2a - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (Alternative Mid-Case "a")										Gasoline Price Range due to Oil Price Volatility **	
Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
1999	19.26	28.70	0.683	0.170	0.853	0.183	0.176	0.0789	1.307	1.281 - 1.334	1.254 - 1.361
2000	19.26	28.70	0.683	0.170	0.853	0.183	0.171	0.0789	1.302	1.276 - 1.329	1.249 - 1.356
2001	19.26	28.70	0.683	0.170	0.853	0.183	0.166	0.0789	1.297	1.271 - 1.324	1.244 - 1.351
2002	19.26	28.70	0.683	0.170	0.853	0.183	0.162	0.0789	1.292	1.266 - 1.319	1.239 - 1.346
2003	19.26	28.70	0.683	0.170	0.853	0.183	0.157	0.0789	1.287	1.260 - 1.314	1.234 - 1.341
2004	19.26	28.70	0.683	0.170	0.853	0.183	0.152	0.0789	1.282	1.255 - 1.309	1.228 - 1.336
2005	19.26	28.70	0.683	0.170	0.853	0.183	0.147	0.0789	1.277	1.250 - 1.303	1.223 - 1.330
2006	19.26	28.70	0.683	0.170	0.853	0.183	0.142	0.0789	1.271	1.244 - 1.298	1.218 - 1.325
2007	19.26	28.70	0.683	0.170	0.853	0.183	0.137	0.0789	1.266	1.239 - 1.293	1.212 - 1.320
2008	19.26	28.70	0.683	0.170	0.853	0.183	0.133	0.0789	1.261	1.234 - 1.288	1.207 - 1.315
2009	19.26	28.70	0.683	0.170	0.853	0.183	0.128	0.0789	1.256	1.229 - 1.283	1.202 - 1.310
2010	19.26	28.70	0.683	0.170	0.853	0.183	0.124	0.0789	1.251	1.225 - 1.278	1.198 - 1.305
2011	19.26	28.70	0.683	0.170	0.853	0.183	0.119	0.0789	1.247	1.220 - 1.274	1.193 - 1.300
2012	19.26	28.70	0.683	0.170	0.853	0.183	0.115	0.0789	1.242	1.215 - 1.269	1.189 - 1.296
2013	19.26	28.70	0.683	0.170	0.853	0.183	0.111	0.0789	1.238	1.211 - 1.265	1.184 - 1.292
2014	19.26	28.70	0.683	0.170	0.853	0.183	0.107	0.0789	1.234	1.207 - 1.261	1.180 - 1.288
2015	19.26	28.70	0.683	0.170	0.853	0.183	0.104	0.0789	1.230	1.203 - 1.257	1.176 - 1.283
2016	19.26	28.70	0.683	0.170	0.853	0.183	0.100	0.0789	1.226	1.199 - 1.253	1.172 - 1.276
2017	19.26	28.70	0.683	0.170	0.853	0.183	0.096	0.0789	1.222	1.195 - 1.249	1.168 - 1.276
2018	19.26	28.70	0.683	0.170	0.853	0.183	0.093	0.0789	1.218	1.192 - 1.245	1.165 - 1.272

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A2b - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (Alternative Mid-Case "b")										Gasoline Price Range due to Oil Price Volatility **	
Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
1999	19.26	28.70	0.683	0.170	0.853	0.179	0.176	0.0789	1.303	1.276 - 1.330	1.249 - 1.356
2000	19.26	28.70	0.683	0.170	0.853	0.174	0.171	0.0789	1.293	1.266 - 1.319	1.239 - 1.346
2001	19.26	28.70	0.683	0.170	0.853	0.169	0.166	0.0789	1.282	1.256 - 1.309	1.229 - 1.336
2002	19.26	28.70	0.683	0.170	0.853	0.164	0.162	0.0789	1.272	1.245 - 1.299	1.218 - 1.326
2003	19.26	28.70	0.683	0.170	0.853	0.159	0.157	0.0789	1.262	1.235 - 1.289	1.208 - 1.315
2004	19.26	28.70	0.683	0.170	0.853	0.155	0.152	0.0789	1.251	1.224 - 1.278	1.198 - 1.305
2005	19.26	28.70	0.683	0.170	0.853	0.149	0.147	0.0789	1.240	1.214 - 1.267	1.187 - 1.294
2006	19.26	28.70	0.683	0.170	0.853	0.144	0.142	0.0789	1.230	1.203 - 1.257	1.176 - 1.283
2007	19.26	28.70	0.683	0.170	0.853	0.140	0.137	0.0789	1.219	1.192 - 1.246	1.166 - 1.273
2008	19.26	28.70	0.683	0.170	0.853	0.135	0.133	0.0789	1.209	1.182 - 1.236	1.155 - 1.263
2009	19.26	28.70	0.683	0.170	0.853	0.130	0.128	0.0789	1.199	1.172 - 1.226	1.145 - 1.253
2010	19.26	28.70	0.683	0.170	0.853	0.126	0.124	0.0789	1.189	1.163 - 1.216	1.136 - 1.243
2011	19.26	28.70	0.683	0.170	0.853	0.121	0.119	0.0789	1.180	1.153 - 1.207	1.126 - 1.234
2012	19.26	28.70	0.683	0.170	0.853	0.117	0.115	0.0789	1.171	1.144 - 1.198	1.118 - 1.225
2013	19.26	28.70	0.683	0.170	0.853	0.113	0.111	0.0789	1.163	1.136 - 1.189	1.109 - 1.216
2014	19.26	28.70	0.683	0.170	0.853	0.109	0.107	0.0789	1.154	1.127 - 1.181	1.101 - 1.208
2015	19.26	28.70	0.683	0.170	0.853	0.105	0.104	0.0789	1.146	1.119 - 1.173	1.092 - 1.200
2016	19.26	28.70	0.683	0.170	0.853	0.102	0.100	0.0789	1.138	1.111 - 1.165	1.085 - 1.192
2017	19.26	28.70	0.683	0.170	0.853	0.098	0.096	0.0789	1.131	1.104 - 1.157	1.077 - 1.184
2018	19.26	28.70	0.683	0.170	0.853	0.095	0.093	0.0789	1.123	1.096 - 1.150	1.069 - 1.177

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A2c - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (Alternative Mid-Case "c")										Gasoline Price Range due to Oil Price Volatility **	
Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	28.70	0.683	0.170	0.853	0.183	0.180	0.0789	1.312	1.285 - 1.339	1.259 - 1.366
1999	19.26	28.70	0.683	0.168	0.852	0.179	0.176	0.0789	1.301	1.274 - 1.328	1.247 - 1.355
2000	19.26	28.70	0.683	0.167	0.850	0.174	0.171	0.0789	1.289	1.262 - 1.316	1.235 - 1.343
2001	19.26	28.70	0.683	0.165	0.848	0.169	0.166	0.0789	1.277	1.250 - 1.304	1.223 - 1.331
2002	19.26	28.70	0.683	0.163	0.847	0.164	0.162	0.0789	1.265	1.238 - 1.292	1.211 - 1.319
2003	19.26	28.70	0.683	0.162	0.845	0.159	0.157	0.0789	1.253	1.226 - 1.280	1.199 - 1.306
2004	19.26	28.70	0.683	0.160	0.843	0.155	0.152	0.0789	1.241	1.214 - 1.267	1.187 - 1.294
2005	19.26	28.70	0.683	0.158	0.842	0.149	0.147	0.0789	1.228	1.201 - 1.255	1.174 - 1.282
2006	19.26	28.70	0.683	0.157	0.840	0.144	0.142	0.0789	1.216	1.189 - 1.242	1.162 - 1.269
2007	19.26	28.70	0.683	0.155	0.839	0.140	0.137	0.0789	1.203	1.177 - 1.230	1.150 - 1.257
2008	19.26	28.70	0.683	0.154	0.837	0.135	0.133	0.0789	1.191	1.165 - 1.218	1.138 - 1.245
2009	19.26	28.70	0.683	0.152	0.835	0.130	0.128	0.0789	1.180	1.153 - 1.207	1.126 - 1.233
2010	19.26	28.70	0.683	0.151	0.834	0.126	0.124	0.0789	1.169	1.142 - 1.195	1.115 - 1.222
2011	19.26	28.70	0.683	0.149	0.832	0.121	0.119	0.0789	1.158	1.131 - 1.184	1.104 - 1.211
2012	19.26	28.70	0.683	0.148	0.831	0.117	0.115	0.0789	1.147	1.120 - 1.174	1.094 - 1.201
2013	19.26	28.70	0.683	0.146	0.829	0.113	0.111	0.0789	1.137	1.110 - 1.164	1.083 - 1.191
2014	19.26	28.70	0.683	0.145	0.828	0.109	0.107	0.0789	1.127	1.100 - 1.154	1.073 - 1.181
2015	19.26	28.70	0.683	0.143	0.827	0.105	0.104	0.0789	1.117	1.091 - 1.144	1.064 - 1.171
2016	19.26	28.70	0.683	0.142	0.825	0.102	0.100	0.0789	1.108	1.081 - 1.135	1.054 - 1.161
2017	19.26	28.70	0.683	0.140	0.824	0.098	0.096	0.0789	1.099	1.072 - 1.125	1.045 - 1.152
2018	19.26	28.70	0.683	0.139	0.822	0.095	0.093	0.0789	1.090	1.063 - 1.116	1.036 - 1.143

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A3 - CARB Phase 2 Reformulated Regular Gasoline Prices in 1998\$ (Low Case)										Gasoline Price Range due to Oil Price Volatility **	
Year	ANS Crude Oil Price per Barrel	Gasoline Spot Price per Barrel *	Gasoline Spot Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	State Excise Tax per Gallon	Weighted State Sales Tax Rate	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	28.44	0.677	0.170	0.847	0.183	0.180	0.0789	1.306	1.279 - 1.332	1.252 - 1.359
1999	18.63	28.36	0.675	0.170	0.845	0.179	0.176	0.0789	1.294	1.267 - 1.321	1.240 - 1.348
2000	18.48	28.28	0.673	0.170	0.843	0.174	0.171	0.0789	1.282	1.255 - 1.309	1.228 - 1.335
2001	18.32	28.20	0.671	0.170	0.841	0.169	0.166	0.0789	1.269	1.243 - 1.296	1.216 - 1.323
2002	18.17	28.11	0.669	0.170	0.839	0.164	0.162	0.0789	1.257	1.230 - 1.284	1.204 - 1.311
2003	18.02	28.03	0.667	0.170	0.837	0.159	0.157	0.0789	1.245	1.218 - 1.272	1.191 - 1.298
2004	17.87	27.95	0.666	0.170	0.836	0.155	0.152	0.0789	1.232	1.205 - 1.259	1.179 - 1.286
2005	17.72	27.87	0.664	0.170	0.834	0.149	0.147	0.0789	1.219	1.192 - 1.246	1.166 - 1.273
2006	17.57	27.79	0.662	0.170	0.832	0.144	0.142	0.0789	1.206	1.180 - 1.233	1.153 - 1.260
2007	17.42	27.71	0.660	0.170	0.830	0.140	0.137	0.0789	1.194	1.167 - 1.221	1.140 - 1.247
2008	17.26	27.63	0.658	0.170	0.828	0.135	0.133	0.0789	1.181	1.155 - 1.208	1.128 - 1.235
2009	17.11	27.55	0.656	0.170	0.826	0.130	0.128	0.0789	1.169	1.143 - 1.196	1.116 - 1.223
2010	16.96	27.47	0.654	0.170	0.824	0.126	0.124	0.0789	1.158	1.131 - 1.185	1.104 - 1.211
2011	16.81	27.38	0.652	0.170	0.822	0.121	0.119	0.0789	1.146	1.120 - 1.173	1.093 - 1.200
2012	16.66	27.30	0.650	0.170	0.820	0.117	0.115	0.0789	1.135	1.109 - 1.162	1.082 - 1.189
2013	16.51	27.22	0.648	0.170	0.818	0.113	0.111	0.0789	1.125	1.098 - 1.152	1.071 - 1.178
2014	16.36	27.14	0.646	0.170	0.816	0.109	0.107	0.0789	1.114	1.088 - 1.141	1.061 - 1.168
2015	16.20	27.06	0.644	0.170	0.814	0.105	0.104	0.0789	1.104	1.077 - 1.131	1.050 - 1.158
2016	16.05	26.98	0.642	0.170	0.812	0.102	0.100	0.0789	1.094	1.067 - 1.121	1.040 - 1.148
2017	15.90	26.90	0.640	0.170	0.810	0.098	0.096	0.0789	1.084	1.058 - 1.111	1.031 - 1.138
2018	15.75	26.82	0.638	0.170	0.808	0.095	0.093	0.0789	1.075	1.048 - 1.102	1.021 - 1.128

* Regression equation: gasoline spot price/barrel = 18.386 + (0.5353 * crude oil price/barrel)

** Variation in gasoline prices due to oil price volatility = 0.5353 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A4 - CARB Reformulated Diesel Prices in 1998\$ (High Case)

Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Retail Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
1999	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2000	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2001	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2002	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2003	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2004	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2005	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2006	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2007	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2008	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2009	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2010	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2011	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2012	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2013	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2014	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2015	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2016	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2017	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654
2018	20.61	31.25	0.744	0.190	0.934	0.243	0.0789	0.180	1.450	1.348 - 1.552	1.245 - 1.654

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A5 - CARB Reformulated Diesel Prices in 1998\$ (Mid-Case)

Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
1999	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2000	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2001	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2002	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2003	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2004	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2005	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2006	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2007	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2008	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2009	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2010	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2011	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2012	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2013	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2014	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2015	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2016	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2017	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501
2018	19.26	29.40	0.700	0.154	0.854	0.243	0.0789	0.180	1.364	1.295 - 1.432	1.227 - 1.501

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A6 - CARB Reformulated Diesel Prices in 1998\$ (Low Case)

Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Retail Price per Gallon (ex tax)	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Retail Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	28.75	0.684	0.154	0.838	0.243	0.0789	0.180	1.347	1.278 - 1.415	1.210 - 1.484
1999	18.63	28.54	0.680	0.154	0.834	0.237	0.0789	0.176	1.331	1.262 - 1.399	1.194 - 1.468
2000	18.48	28.33	0.675	0.154	0.829	0.231	0.0789	0.171	1.314	1.246 - 1.383	1.177 - 1.451
2001	18.33	28.13	0.670	0.154	0.824	0.224	0.0789	0.166	1.297	1.229 - 1.366	1.160 - 1.434
2002	18.17	27.92	0.665	0.154	0.819	0.218	0.0789	0.162	1.280	1.212 - 1.349	1.143 - 1.417
2003	18.02	27.71	0.660	0.154	0.814	0.212	0.0789	0.157	1.263	1.195 - 1.332	1.126 - 1.400
2004	17.87	27.51	0.655	0.154	0.809	0.205	0.0789	0.152	1.246	1.178 - 1.315	1.109 - 1.383
2005	17.72	27.30	0.650	0.154	0.804	0.198	0.0789	0.147	1.229	1.160 - 1.297	1.091 - 1.366
2006	17.57	27.09	0.645	0.154	0.799	0.192	0.0789	0.142	1.211	1.143 - 1.280	1.074 - 1.348
2007	17.42	26.88	0.640	0.154	0.794	0.185	0.0789	0.137	1.194	1.125 - 1.262	1.057 - 1.331
2008	17.27	26.68	0.635	0.154	0.789	0.179	0.0789	0.133	1.177	1.108 - 1.246	1.040 - 1.314
2009	17.11	26.47	0.630	0.154	0.784	0.173	0.0789	0.128	1.160	1.092 - 1.229	1.023 - 1.298
2010	16.96	26.26	0.625	0.154	0.779	0.167	0.0789	0.124	1.144	1.076 - 1.213	1.007 - 1.281
2011	16.81	26.06	0.620	0.154	0.774	0.161	0.0789	0.119	1.129	1.060 - 1.197	0.991 - 1.266
2012	16.66	25.85	0.615	0.154	0.769	0.156	0.0789	0.115	1.113	1.045 - 1.182	0.976 - 1.250
2013	16.51	25.64	0.610	0.154	0.764	0.150	0.0789	0.111	1.098	1.030 - 1.167	0.961 - 1.235
2014	16.36	25.43	0.606	0.154	0.760	0.145	0.0789	0.107	1.083	1.015 - 1.152	0.946 - 1.220
2015	16.21	25.23	0.601	0.154	0.755	0.140	0.0789	0.104	1.069	1.000 - 1.137	0.932 - 1.206
2016	16.05	25.02	0.596	0.154	0.750	0.135	0.0789	0.100	1.055	0.986 - 1.123	0.918 - 1.192
2017	15.90	24.81	0.591	0.154	0.745	0.130	0.0789	0.096	1.041	0.972 - 1.109	0.904 - 1.178
2018	15.75	24.60	0.586	0.154	0.740	0.126	0.0789	0.093	1.027	0.958 - 1.095	0.890 - 1.164

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A7 - Railroad Diesel Prices in 1998\$ (High Case)

RR Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Railroad Diesel Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
1999	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2000	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2001	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2002	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2003	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2004	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2005	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2006	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2007	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2008	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2009	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2010	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2011	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2012	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2013	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2014	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2015	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2016	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2017	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082
2018	20.61	31.25	0.744	0.069	0.0789	0.877	0.775 - 0.980	0.673 - 1.082

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A8 - Railroad Diesel Prices in 1998\$ (Mid-Case)

RR Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Railroad Diesel Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
1999	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2000	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2001	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2002	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2003	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2004	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2005	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2006	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2007	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2008	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2009	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2010	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2011	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2012	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2013	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2014	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2015	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2016	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2017	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967
2018	19.26	29.40	0.700	0.069	0.0789	0.830	0.761 - 0.898	0.693 - 0.967

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42

* (1 + sales tax)

Table A9 - Railroad Diesel Prices in 1998\$ (Low Case)

RR Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Railroad Diesel Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	28.75	0.684	0.069	0.0789	0.813	0.744 - 0.881	0.676 - 0.950
1999	18.63	28.54	0.680	0.067	0.0789	0.806	0.737 - 0.874	0.669 - 0.943
2000	18.48	28.33	0.675	0.066	0.0789	0.799	0.730 - 0.867	0.661 - 0.936
2001	18.33	28.13	0.670	0.064	0.0789	0.791	0.723 - 0.860	0.654 - 0.928
2002	18.17	27.92	0.665	0.062	0.0789	0.784	0.715 - 0.853	0.647 - 0.921
2003	18.02	27.71	0.660	0.060	0.0789	0.777	0.708 - 0.845	0.640 - 0.914
2004	17.87	27.51	0.655	0.058	0.0789	0.769	0.701 - 0.838	0.632 - 0.906
2005	17.72	27.30	0.650	0.056	0.0789	0.762	0.694 - 0.831	0.625 - 0.899
2006	17.57	27.09	0.645	0.054	0.0789	0.755	0.686 - 0.823	0.618 - 0.892
2007	17.42	26.88	0.640	0.053	0.0789	0.747	0.679 - 0.816	0.610 - 0.884
2008	17.27	26.68	0.635	0.051	0.0789	0.740	0.672 - 0.809	0.603 - 0.877
2009	17.11	26.47	0.630	0.049	0.0789	0.733	0.664 - 0.801	0.596 - 0.870
2010	16.96	26.26	0.625	0.047	0.0789	0.726	0.657 - 0.794	0.589 - 0.863
2011	16.81	26.06	0.620	0.046	0.0789	0.719	0.650 - 0.787	0.582 - 0.856
2012	16.66	25.85	0.615	0.044	0.0789	0.712	0.643 - 0.780	0.575 - 0.849
2013	16.51	25.64	0.610	0.043	0.0789	0.705	0.636 - 0.773	0.568 - 0.842
2014	16.36	25.43	0.606	0.041	0.0789	0.698	0.629 - 0.766	0.561 - 0.835
2015	16.21	25.23	0.601	0.040	0.0789	0.691	0.622 - 0.759	0.554 - 0.828
2016	16.05	25.02	0.596	0.038	0.0789	0.684	0.616 - 0.753	0.547 - 0.821
2017	15.90	24.81	0.591	0.037	0.0789	0.677	0.609 - 0.746	0.540 - 0.814
2018	15.75	24.60	0.586	0.036	0.0789	0.670	0.602 - 0.739	0.533 - 0.808

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A10 - Agricultural Off-Road Diesel Prices in 1998\$ (High Case)

Ag Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Weighted State Sales Tax Rate	Agricultural Diesel Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
1999	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2000	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2001	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2002	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2003	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2004	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2005	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2006	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2007	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2008	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2009	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2010	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2011	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2012	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2013	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2014	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2015	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2016	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2017	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115
2018	20.61	31.25	0.744	0.100	0.0789	0.911	0.808 - 1.013	0.706 - 1.115

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A11 - Agricultural Off-Road Diesel Prices in 1998\$ (Mid-Case)

Ag Diesel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Weighted State Sales Tax Rate	Agricultural Diesel Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
1999	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2000	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2001	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2002	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2003	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2004	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2005	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2006	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2007	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2008	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2009	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2010	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2011	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2012	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2013	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2014	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2015	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2016	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2017	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979
2018	19.26	29.40	0.700	0.080	0.0789	0.842	0.773 - 0.910	0.705 - 0.979

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42

* (1 + sales tax)

Table A12 - Agricultural Off-Road Diesel Prices in 1998\$ (Low Case)

Year	ANS Crude Oil Price per Barrel	Diesel Rack Price per Barrel *	Diesel Rack Price per Gallon	Markup per Gallon	Weighted State Sales Tax Rate	Agricultural Diesel Price per Gallon	Ag Diesel Price Range due to Oil Price Volatility **	
							One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	28.75	0.684	0.080	0.0789	0.825	0.756 - 0.893	0.688 - 0.962
1999	18.63	28.54	0.680	0.080	0.0789	0.819	0.751 - 0.888	0.682 - 0.957
2000	18.48	28.33	0.675	0.080	0.0789	0.814	0.746 - 0.883	0.677 - 0.951
2001	18.33	28.13	0.670	0.080	0.0789	0.809	0.740 - 0.877	0.672 - 0.946
2002	18.17	27.92	0.665	0.080	0.0789	0.804	0.735 - 0.872	0.666 - 0.941
2003	18.02	27.71	0.660	0.080	0.0789	0.798	0.730 - 0.867	0.661 - 0.935
2004	17.87	27.51	0.655	0.080	0.0789	0.793	0.724 - 0.861	0.656 - 0.930
2005	17.72	27.30	0.650	0.080	0.0789	0.788	0.719 - 0.856	0.650 - 0.925
2006	17.57	27.09	0.645	0.080	0.0789	0.782	0.714 - 0.851	0.645 - 0.919
2007	17.42	26.88	0.640	0.080	0.0789	0.777	0.708 - 0.845	0.640 - 0.914
2008	17.27	26.68	0.635	0.080	0.0789	0.772	0.703 - 0.840	0.635 - 0.909
2009	17.11	26.47	0.630	0.080	0.0789	0.766	0.698 - 0.835	0.629 - 0.903
2010	16.96	26.26	0.625	0.080	0.0789	0.761	0.692 - 0.829	0.624 - 0.898
2011	16.81	26.06	0.620	0.080	0.0789	0.756	0.687 - 0.824	0.619 - 0.893
2012	16.66	25.85	0.615	0.080	0.0789	0.750	0.682 - 0.819	0.613 - 0.887
2013	16.51	25.64	0.610	0.080	0.0789	0.745	0.676 - 0.814	0.608 - 0.882
2014	16.36	25.43	0.606	0.080	0.0789	0.740	0.671 - 0.808	0.603 - 0.877
2015	16.21	25.23	0.601	0.080	0.0789	0.734	0.666 - 0.803	0.597 - 0.871
2016	16.05	25.02	0.596	0.080	0.0789	0.729	0.660 - 0.798	0.592 - 0.866
2017	15.90	24.81	0.591	0.080	0.0789	0.724	0.655 - 0.792	0.587 - 0.861
2018	15.75	24.60	0.586	0.080	0.0789	0.718	0.650 - 0.787	0.581 - 0.855

* Regression equation: diesel rack price/barrel = 3.0549 + (1.3681 * crude oil price/barrel)

** Variation in diesel prices due to oil price volatility = 1.3681 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A13 - Commercial Jet Fuel Kerosene Prices in 1998\$ (High Case)

Jet Fuel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Jet Fuel Spot Price per Barrel *	Jet Fuel Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Jet Fuel Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
1999	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2000	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2001	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2002	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2003	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2004	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2005	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2006	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2007	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2008	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2009	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2010	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2011	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2012	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2013	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2014	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2015	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2016	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2017	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103
2018	20.61	28.44	0.677	0.080	0.044	0.0789	0.864	0.745 - 0.984	0.626 - 1.103

* Regression equation: jet fuel spot price/barrel = -4.4781 + (1.5973 * crude oil price/barrel)

** Variation in jet fuel prices due to oil price volatility = 1.5973 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A14 - Commercial Jet Fuel Kerosene Prices in 1998\$ (Mid-Case)

Jet Fuel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Jet Fuel Spot Price per Barrel *	Jet Fuel Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Jet Fuel Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
1999	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2000	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2001	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2002	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2003	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2004	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2005	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2006	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2007	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2008	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2009	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2010	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2011	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2012	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2013	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2014	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2015	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2016	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2017	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947
2018	19.26	26.29	0.626	0.060	0.044	0.0789	0.787	0.707 - 0.867	0.627 - 0.947

* Regression equation: jet fuel spot price/barrel = -4.4781 + (1.5973 * crude oil price/barrel)

** Variation in jet fuel prices due to oil price volatility = 1.5973 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A15 - Commercial Jet Fuel Kerosene Prices in 1998\$ (Low Case)

Jet Fuel Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Jet Fuel Spot Price per Barrel *	Jet Fuel Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	Jet Fuel Price per Gallon	One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	25.52	0.608	0.060	0.044	0.0789	0.768	0.688 - 0.848	0.608 - 0.928
1999	18.63	25.28	0.602	0.060	0.043	0.0789	0.760	0.680 - 0.840	0.600 - 0.920
2000	18.48	25.04	0.596	0.060	0.042	0.0789	0.753	0.673 - 0.833	0.593 - 0.913
2001	18.33	24.79	0.590	0.060	0.041	0.0789	0.745	0.665 - 0.826	0.585 - 0.906
2002	18.17	24.55	0.585	0.060	0.039	0.0789	0.738	0.658 - 0.818	0.578 - 0.898
2003	18.02	24.31	0.579	0.060	0.038	0.0789	0.731	0.651 - 0.811	0.571 - 0.891
2004	17.87	24.07	0.573	0.060	0.037	0.0789	0.723	0.643 - 0.803	0.563 - 0.883
2005	17.72	23.83	0.567	0.060	0.036	0.0789	0.716	0.636 - 0.796	0.556 - 0.876
2006	17.57	23.58	0.562	0.060	0.035	0.0789	0.708	0.628 - 0.788	0.548 - 0.868
2007	17.42	23.34	0.556	0.060	0.034	0.0789	0.701	0.621 - 0.781	0.541 - 0.861
2008	17.27	23.10	0.550	0.060	0.032	0.0789	0.693	0.613 - 0.773	0.533 - 0.853
2009	17.11	22.86	0.544	0.060	0.031	0.0789	0.686	0.606 - 0.766	0.526 - 0.846
2010	16.96	22.62	0.539	0.060	0.030	0.0789	0.678	0.598 - 0.758	0.518 - 0.838
2011	16.81	22.38	0.533	0.060	0.029	0.0789	0.671	0.591 - 0.751	0.511 - 0.831
2012	16.66	22.13	0.527	0.060	0.028	0.0789	0.664	0.584 - 0.744	0.504 - 0.824
2013	16.51	21.89	0.521	0.060	0.027	0.0789	0.656	0.576 - 0.736	0.496 - 0.816
2014	16.36	21.65	0.515	0.060	0.026	0.0789	0.649	0.569 - 0.729	0.489 - 0.809
2015	16.21	21.41	0.510	0.060	0.025	0.0789	0.642	0.562 - 0.722	0.482 - 0.802
2016	16.05	21.17	0.504	0.060	0.024	0.0789	0.635	0.555 - 0.715	0.475 - 0.795
2017	15.90	20.92	0.498	0.060	0.024	0.0789	0.628	0.548 - 0.708	0.468 - 0.788
2018	15.75	20.68	0.492	0.060	0.023	0.0789	0.620	0.540 - 0.701	0.460 - 0.781

* Regression equation: jet fuel spot price/barrel = -4.4781 + (1.5973 * crude oil price/barrel)

** Variation in jet fuel prices due to oil price volatility = 1.5973 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + state sales tax)

Table A16 - Fleet Propane Prices in 1998\$ (High Case)

Propane Price Range due to Oil Price Volatility **

Year	ANS Crude Oil Price per Barrel	Propane Spot Price per Barrel *	Propane Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Propane Price per Gallon	One Standard Deviation (\$2.91/Barrel)	Two Standard Deviations
1998	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
1999	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2000	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2001	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2002	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2003	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2004	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2005	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2006	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2007	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2008	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2009	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2010	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2011	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2012	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2013	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2014	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2015	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2016	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2017	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378
2018	20.61	21.29	0.507	0.250	0.136	0.0789	0.060	1.023	0.846 - 1.200	0.669 - 1.378

* Regression equation: propane spot price/barrel = -27.563 + (2.3702 * crude oil price/barrel)

** Variation in propane prices due to oil price volatility = 2.3702 * standard deviation for 1986-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A17 - Fleet Propane Prices in 1998\$ (Mid-Case)

Year	ANS Crude Oil Price per Barrel	Propane Spot Price per Barrel *	Propane Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Propane Price per Gallon	Propane Price Range due to Oil Price Volatility **	
									One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
1999	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2000	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2001	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2002	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2003	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2004	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2005	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2006	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2007	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2008	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2009	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2010	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2011	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2012	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2013	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2014	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2015	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2016	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2017	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179
2018	19.26	18.09	0.431	0.250	0.136	0.0789	0.060	0.941	0.822 - 1.060	0.704 - 1.179

* Regression equation: propane spot price/barrel = -27.563 + (2.3702 * crude oil price/barrel)

** Variation in propane prices due to oil price volatility = 2.3702 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + sales tax)

Table A18 - Fleet Propane Prices in 1998\$ (Low Case)

Year	ANS Crude Oil Price per Barrel	Propane Spot Price per Barrel *	Propane Spot Price per Gallon	Markup per Gallon	Federal Excise Tax per Gallon	Weighted State Sales Tax Rate	State Excise Tax per Gallon	Propane Price per Gallon	Propane Price Range due to Oil Price Volatility **	
									One Standard Deviation (\$1.95/Barrel)	Two Standard Deviations
1998	18.78	16.95	0.404	0.250	0.136	0.0789	0.060	0.912	0.793 - 1.031	0.674 - 1.149
1999	18.63	16.59	0.395	0.250	0.133	0.0789	0.059	0.898	0.779 - 1.016	0.660 - 1.135
2000	18.48	16.23	0.386	0.250	0.129	0.0789	0.057	0.883	0.764 - 1.002	0.646 - 1.121
2001	18.33	15.87	0.378	0.250	0.126	0.0789	0.055	0.868	0.750 - 0.987	0.631 - 1.106
2002	18.17	15.51	0.369	0.250	0.122	0.0789	0.054	0.854	0.735 - 0.973	0.616 - 1.091
2003	18.02	15.16	0.361	0.250	0.119	0.0789	0.052	0.839	0.720 - 0.958	0.602 - 1.077
2004	17.87	14.80	0.352	0.250	0.115	0.0789	0.051	0.824	0.706 - 0.943	0.587 - 1.062
2005	17.72	14.44	0.344	0.250	0.111	0.0789	0.049	0.809	0.691 - 0.928	0.572 - 1.047
2006	17.57	14.08	0.335	0.250	0.107	0.0789	0.047	0.795	0.676 - 0.913	0.557 - 1.032
2007	17.42	13.72	0.327	0.250	0.104	0.0789	0.046	0.780	0.661 - 0.899	0.542 - 1.017
2008	17.27	13.36	0.318	0.250	0.100	0.0789	0.044	0.765	0.646 - 0.884	0.528 - 1.003
2009	17.11	13.00	0.310	0.250	0.097	0.0789	0.043	0.751	0.632 - 0.869	0.513 - 0.988
2010	16.96	12.64	0.301	0.250	0.093	0.0789	0.041	0.736	0.618 - 0.855	0.499 - 0.974
2011	16.81	12.28	0.292	0.250	0.090	0.0789	0.040	0.722	0.604 - 0.841	0.485 - 0.960
2012	16.66	11.93	0.284	0.250	0.087	0.0789	0.038	0.708	0.590 - 0.827	0.471 - 0.946
2013	16.51	11.57	0.275	0.250	0.084	0.0789	0.037	0.695	0.576 - 0.813	0.457 - 0.932
2014	16.36	11.21	0.267	0.250	0.081	0.0789	0.036	0.681	0.562 - 0.800	0.444 - 0.918
2015	16.21	10.85	0.258	0.250	0.078	0.0789	0.035	0.667	0.549 - 0.786	0.430 - 0.905
2016	16.05	10.49	0.250	0.250	0.076	0.0789	0.033	0.654	0.535 - 0.773	0.417 - 0.892
2017	15.90	10.13	0.241	0.250	0.073	0.0789	0.032	0.641	0.522 - 0.760	0.403 - 0.878
2018	15.75	9.77	0.233	0.250	0.070	0.0789	0.031	0.628	0.509 - 0.746	0.390 - 0.865

* Regression equation: propane spot price/barrel = -27.563 + (2.3702 * crude oil price/barrel)

** Variation in propane prices due to oil price volatility = 2.3702 * standard deviation for 1991-97 mean annual per barrel oil price / 42 * (1 + sales tax)